NOTE: In class we just found test solutions for y_p. Solve, as always, means "give the general solution."

Problem 1

Solve the differential equation:

$$y'' + 3y' + 2y = 8 + x^2 e^{-x} + 2\sin(x)$$

Problem 2

Solve the differential equation:

$$y'' + y' = x + \sin(2x) + \cos x$$

Problem 3

Solve the differential equation:

$$y'' + 2y' + y = 4x^2 e^{-x} + \sin x + 5$$

Problem 4

Solve the differential equation:

$$y''' - y' = e^{2x} \sin^2 x + x^2$$